Recurrence rate of PSVT (Paroxysmal Supraventricular Tachycardia) in Rajavithi Emergency Department

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Background: *PSVT (Paroxysmal Supraventricular Tachycardia) is a common heart disease, especially in young people. Although PSVT is not a life-threatening illness, its symptoms occur in a sudden onset and with increasing frequency. Because of the severity of its symptoms, it can interfere with patients' quality of life and lead to an increase in anxiety levels. The authors found that patients with PSVT tended to have recurrence of symptoms; however, there has been no previous study in Thailand of the rate of recurrent PSVT in adults. Moreover, there has been no study of the factors which precipitate PSVT, cause recurrence, and result in hospitalization.*

Objective: *To study the rate of recurrence of PSVT within 90 days, the precipitating factors that cause PSVT, and the relationship between the factors that affect recurrence of symptoms and result in admission to hospital.*

Material and Method: *This was a cross-sectional study of patients who had been diagnosed with PSVT and were treated in the emergency room at Rajavithi Hospital from 1st August 2008-31st August 2011. The primary outcome was recurrence of PSVT within 90 days and its impact on hospital admission.*

Results: *The 55 patients in the present study visited the hospital 94 times. The authors found that: 20.0% of patients had recurrence of PSVT within 90 days; 45.7% of patients had no precipitating factors; 33.0% of patients had emotional stress; and 20.0% of patients had stopped taking their medication. Patients who presented at their first visit with a heart rate of more than 200 beats per minute were more likely to have recurrence (statistically significant, HR 2.43, p = 0.017). Patients presenting with low systolic blood pressure (SBP < 90 mmHg), long duration of symptoms, structural heart disease, low serum Hematocrit concentration (Hct < 30%), serum sodium < 135 milligram, and serum potassium < 3.5 milligram were more likely to be admitted to hospital (statistically significant at p = 0.013, 0.012, 0.004, 0.001, 0.001, and 0.004 respectively).*

Conclusion: *There was a high rate of recurrence of PSVT in patients in the emergency department at Rajavithi Hospital. Significant factors affecting recurrence were patients presenting with initial heart rate of over 200 beats per minute. Low systolic blood pressure, long duration of symptoms, structural heart disease, low serum Hematocrit, low serum sodium and serum potassium were associated with hospitalization.*

Keywords: *PSVT (Paroxysmal Supraventricular Tachycardia), Heart rate*

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Paroxysmal Supraventricular Tachycardia (PSVT)[1-3] is the occurrence of episodes of a fast heart rate and is commonly found in younger patients. Although PSVT is not a life-threatening illness, it has a sudden onset with increasing frequency of symptoms. Because of the severity of its symptoms, it can have an adverse effect on the sufferers' quality of life, and it can lead to increased levels of anxiety. Problems caused by PSVT symptoms resulted in patients' visiting the emergency room several times in the years 2008 and 2009. There were 8 cases of recurrence of PSVT in the year 2008 and 11 cases in the year 2009. There have been no studies of the cause of recurrence of PSVT in patients in the emergency room at Rajavithi Hospital or in any other medical institution. The prevalence of the problem and the precipitating factors which bring about recurrence are not known. Therefore, the factors and conditions that may adversely affect patient care are important and could contribute to the assessment of individual patients in order to prevent recurrence and could be useful in the monitoring of patients in high-risk groups.

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Material and Method

In this cross-sectional study, data were collected from past descriptive studies. PSVT

(paroxysmal supraventricular tachycardia) is indicated by an abnormally fast heart rate. Originating at the AV node, an Electrocardiogram (ECG) will show a narrow QRS complex rhythm. The present study included only AV-associated tachycardia, as the treatments of AVNRT (atrioventricular nodal re-entrant tachycardia), AVRT (atrioventricular re-entrant tachycardia) and AT (atrial tachycardia) in the acute phase are similar. Recurrence of PSVT was defined as tachycardia which caused patients to visit hospital on more than one occasion. Abnormalities caused by PSVT can be detected by 12-lead Electrocardiogram (ECG) at the hospital. Energy-drinks are defined as beverages containing caffeine such as tea, coffee and energy drinks. The present study collected data from all patients at the emergency room in Rajavithi Hospital with symptoms of palpitations who were diagnosed with PSVT. This study was approved by the ethics committee of Rajavithi Hospital.

The inclusion criteria were patients who: were at least 18 years old; were patients in the emergency room at Rajavithi Hospital; had been diagnosed with tachycardia heart rate and with PSVT from 1 September 2008 to 31 August 2011; had PSVT symptoms diagnosed by a doctor in the emergency room or by a cardiologist; and had been confirmed by Electrocardiogram (12-lead ECG) to have a heart rate of over 150 beats per minute and an irregular heart rate. The exclusion criteria were patients whose ECG showed PSVT which was not AVNRT, AVRT or AT; patients who did not receive treatment and follow-up for illness within 90 days; and patients who died. The present study collected data from patients who came to receive diagnosis and treatment of PSVT abnormal heart rate in the emergency room at Rajavithi Hospital between 1st August 2008 and 31st August 2011. Cases were confirmed by 12-lead ECG and PSVT. Symptoms of tachycardia were resolved by using one of the following standard treatments: vasovagal maneuvers; or anti-arrhythmics drugs such as adenosine and calcium antagonists; or electrical cardioversion. Data were collected from a review of medical records from 1st September 2008 to 31 August 2011. General data was collected relating to the factors that can cause symptoms of PSVT and the standard treatment. Data was also drawn from laboratory tests such as complete blood count (CBC), blood urea nitrogen (BUN), creatinine (Cr), Electrolytes, Calcium (Ca), magnesium (Mg), phosphate (PO3), albumin (alb), blood sugar (BS), troponin T (Trop-T), and thyroid function test (TFT)[8]. All patients treated in the emergency room had their symptoms monitored, and blood tests were done for thyroid function, side effects of drugs and clinical symptoms around one week after treatment and continuous follow-up symptoms until patients returned to the hospital with symptoms of recurrence of PSVT.

Statistical analysis

Data were analyzed using SPSS version 17.0 and presented as percentages, pie chart and graphs. Kaplan Meier magnitude of the prevalence of heart beat faster unusual type of PSVT analysis. Relationships between categorical data were analysed using Chi-square and Fisher's exact test. Student t-test and/or Mann Whitney U-test were used for comparison between continuous data. Statistical significance was set at $p < 0.050$.

Results

Of the 89 subjects who were diagnosed with PSVT, 34 were excluded from the present study. The remaining 55 patients visited the emergency room with symptoms of PSVT a total of 94 times, 20 of the visits occurred within 90 days, and 35 visits occurred after more than 90 days. There were 16 patients (29.1%) who had recurrence of symptoms and 11 patients (20.0%) came back with recurrence of symptoms within in 90 days. The maximum number of recurrences of symptoms of PSVT per person was 12 times in 3 years, and the average recurrence 1.36 times in 90 days.

A total of 25 patients (45.5%) received cardiac abrasion: 16 patients (29.1%) had the AVNRT type, 8 patients (14.5%) had AVRT, and 1 patient (1.8%) had AT as shown in Fig. 1. Of the patients who had recurrence within 90 days resulting in a visit to the hospital 72.7% had a single recurrence; 18.2% had two

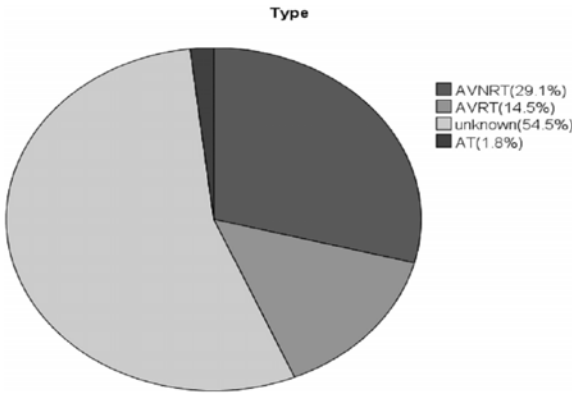

Fig. 1 The percentage of different types of PSVT in the emergency room of Rajavithi Hospital

Table 1. Demographicdata of all patients

	Whole Group	Non-recurrence	Recurrence	p-value
Number	55 (100.0)	44 (80.0)	11 (20.0)	-
Age (years)	48.42 ± 7.71	49.48 ± 6.96	47.36 ± 7.78	0.120
Gender				0.395
Female	19 (34.5)	14 (73.7)	5 (26.3)	
Male	36 (65.5)	30 (83.3)	6 (16.7)	
Pre-treatment Heart Rate(beats per minute)	178.44 ± 4.22	175.43 ± 5.80	181.45 ± 9.01	0.070
Systolic Blood Pressure (mmHg)	120.58 ± 12.04	116.89 ± 15.65	124.27 ± 12.34	0.090
Duration(hours), Mean□SD	9.62 ± 8.91	13.73 ± 10.03	5.51 ± 3.03	0.010*
Post-treatment Heart Rate (beats per minute)	96.29 ± 4.54	96.30 ± 5.14	96.27 ± 10.46	0.060
Disposition				0.882
Admit	16 (29.1)	13 (81.2)	3 (18.8)	
Mean length of stay (hour)	140.78 ± 8.53	193.56 ± 7.12	88.00 ± 3.52	0.110
Discharge	39 (70.9)	31 (79.5)	8 (20.5)	
Mean length of stay (hour)	4.85 ± 1.41	5.50 ± 1.11	4.19 ± 1.31	0.090

Values are represented as n (%), Means ± SD

recurrences; and 9.1% had three recurrences.

The rate of return was quite high in the first 20 days, at about 15.0%. The rate of accumulation recurrence was also high in first 20 days, at about 15.0%.

Demographic data of all patients is shown in Table 1. The average age of the population studied was 48.42 ± 7.71 years: the average age of the Non-Recurrence group was slightly less than that of the Recurrence group at 47.36 ± 7.78 years and 49.48 ± 6.96 years respectively. The majority of patients (65.5%) were male, but there was a higher rate of recurrence among female patients (26.3% compared to the male rate of 16.7%). Heart rates on admission and after PSVT treatment were similar in the two groups. The average duration of symptoms prior to visiting the hospital was shorter in the Recurrence group than in the Non-Recurrence group (5.51 ± 9.01 hours and 13.73 ± 10.03 hours respectively). The total number of patients admitted to hospital was 16 (29.1%), including 13 from the Non-Recurrence group (81.3%) in comparison to 3 (18.8%) from the Recurrence group; the other 39 patients (70.9%) were discharged. The average duration of hospital stay was 140.78 ± 8.53 hours, and the average time spent in the emergency room was 4.85 ± 1.41 hours.

The most common symptoms which resulted in admission to hospital were palpitations (55%), followed by chest pain (18.0%), and dyspnea (16.0%). Fainting (5.0%), dizziness (3.0%), and fever (3.0%) were less common reasons as shown in Fig. 2.

Fig. 3 shows the situations in which patients

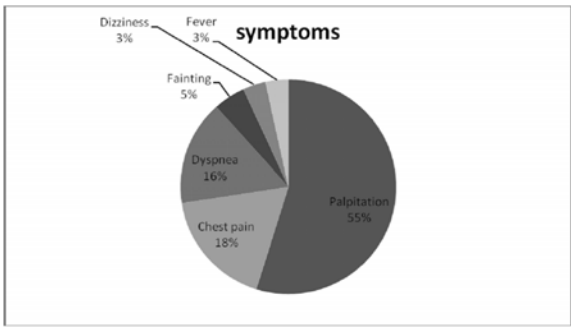

Fig. 2 Symptoms which caused patients come to hospital with abnormal heart rate of PSVT

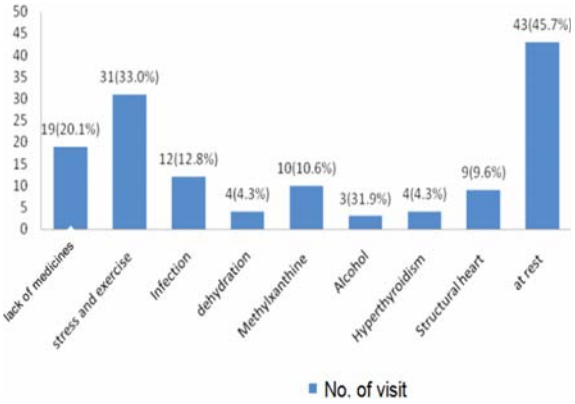

Fig. 3 Precipitating factors of PSVT in the emergency room, Rajavithi Hospital

begin to experience symptoms. The most common scenario is when the patients are at rest (45.7%),

followed by when they are exercising or under stress (33.0%). Another common precipitating factor was patients' discontinuing their medication (20.1%). Analysis of multiple associated factors by Cox-regression shows that the factors in a multi-factor analysis of the relationship with the recurrence rate of the patient's with PSVT in 9 factors analysis showed that patients with a heart rate on admission of more than 200 beats per minute were more likely to have recurrence of PSVT and the figures were statistically significant (HR 2.43, p = 0.017) as shown in Fig. 4. Female patients, people younger than 60 years old, and patients who had structural abnormalities of the heart, thyroid toxicity, infections, or a heart rate after treatment with electrical shock current of more than 100 beats per minute were more likely to have recurrence, but the

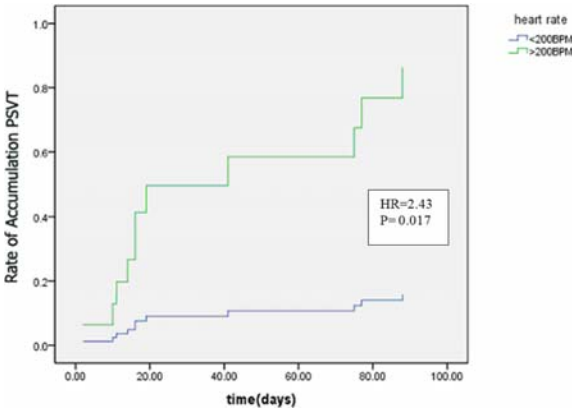

Fig. 4 Rate of accumulation PSVT comparing heart rates on admission of more than 200 beats per minute and less than 200 beats per minute

Table 2. Factors involved in patients' admission to hospital

	Whole group	Admit	Discharge	p-value
Over all visits	94 (100.0)	18 (19.1)	76 (80.9)	-
Age	51.98 ± 8.11	55.78 ± 10.18	48.18 ± 9.56	0.085
Systolic blood pressure	116.83 ± 10.15	110.06 ± 8.19	123.59 ± 9.51	0.013*
Pre-treatment heart rate	177.07 ± 12.50	179.67 ± 15.81	174.46 ± 13.15	0.340
Post-treatment heart rate	96.62 ± 11.11	100.56 ± 14.71	92.68 ± 13.54	0.062
Duration (hours)	13.32 ± 4.10	20.67 ± 8.59	5.96 ± 3.10	0.012*
Revisit				0.004*
Yes	39 (41.5)	2 (5.1)	37 (94.9)	
No	55 (58.5)	16 (29.1)	39 (70.9)	
Haematocrit	37.21 ± 3.21	35.41 ± 2.11	39.01 ± 2.44	0.012*
Haematocrit (n = 79)				0.001*
< 30	9 (11.4)	4 (44.4)	5 (55.6)	
≥ 30	70 (88.6)	2 (2.9)	68 (97.1)	
Sodium	139.07 ± 3.41	138.22 ± 4.67	139.91 ± 3.31	0.241
Sodium				0.001*
< 135 mg	9 (11.4)	4 (44.4)	5 (55.6)	
≥ 135 mg	70 (88.6)	2 (2.9)	68 (97.1)	
Potassium	3.71 ± 0.41	3.61 ± 0.24	3.81 ± 0.41	0.103
Potassium				0.004*
< 3.5 mg	21 (24.7)	7 (33.3)	14 (66.7)	
≥ 3.5 mg	64 (75.3)	5 (7.8)	59 (92.2)	
Infection				0.088
Yes	14 (14.9)	5 (35.7)	9 (64.3)	
No	80 (85.1)	13 (16.2)	67 (83.8)	
Dehydration				0.109
Yes	4 (4.3)	2 (50.0)	2 (50.0)	
No	90 (95.7)	16 (17.8)	74 (82.2)	
Structural heart				0.004*
Yes	9 (9.6)	5 (55.6)	4 (44.4)	
No	85 (90.4)	13 (15.3)	72 (84.7)	

* = Significant at $p < 0.050$
Values are represented as n (%), Means ± SD

values were not statistically significant.

Table 2 shows the factors which resulted in hospital admission. Patients with low systolic blood pressure, serum haematocrit < 30%, serum sodium < 135 milligram, serum potassium < 3.5 milligram, or structural heart abnormalities were more likely to be admitted to hospital, and these values were statistically significant.

The present study found that of those who were admitted to hospital, those with lower systolic blood pressure (SBP < 90 mmHg) were more likely to be able to return home, and this figure was statistically significant (p = 0.013). With regard to the duration of symptoms before presenting to hospital those patients who had had symptoms for an extended period were more likely to be admitted to hospital, and the values were statistically significant (p = 0.012). Serum haematocrit (Hct) of less than 30% was also a factor significantly associated with hospital admission (p = 0.001), as were serum sodium < 135 milligram (p = 0.001), serum potassium < 3.5 milligram (p = 0.004), and structural heart abnormalities (p = 0.004) as shown in Table 2.

Discussion

The present study found that adult patients with PSVT heart disease in the emergency room at Rajavithi Hospital had a lower rate of recurrence than children in a recent study which found that children had a recurrence rate within the first 24 hours of 18 to 25%[4,6]. The present study was in adults, and the authors found that they had a recurrence rate of 15% in the first 20 days. With regard to gender, the majority (65.5%) of our subjects were male, unlike an Australian study in which the number of females was double the number of males[1] and in which the type of PSVT in all patients was not recorded. As only 45.5% of our patients received cardiac abrasion therapy, the authors cannot compare our figures for rate of return with those of reports carried out in other countries[7-9]. A heart rate of over 200 beats per minute was significantly associated with recurrence in the small population in the present study. Further studies of larger populations may show this even more clearly. Structural abnormalities of the heart also appear to be a statistically significant risk factor of PSVT[10-12]. With regard to whether increased Troponin-T is associated with admission to hospital, the authors were unable to draw any conclusions because the number of blood samples was small and only one patient in the hospital showed positive results. It was found that patients who had symptoms for more than an hour before arriving at the hospital had a lower rate of recurrence than patients who had shorter duration of symptoms. A limitation of the present study was in terms of selection of subjects: the number of patients who returned to the hopital may have been influenced by the distance that they had to travel, and patients' addresses were not recorded during the present study. It is possible that the recurrence figures were lower because people lived far from the hospital. In the future, patients may have faster and more comfortable access to the hospital.

There were two main reasons why the population in Bangkok had a large number of return visits to hospital with recurrence of PSV. Firstly, as soon as patients' symptoms were alleviated, they were discharged from the hospital, and this was probably too soon.

Secondly, the patients awareness of health care is inadequate, so that they do not recognise the symptoms of their disease in time.

If this knowledge and awareness can be provided, the number of patients requiring hospitalization may be reduced. Blood concentration has an effect on patients' hospitalisation, and specifically, a level of concentration of haematocrit of less than 30% was significant in the present study.

Conclusion

The recurrence rate of PSVT in patients in the emergency department at Rajavithi Hospital is high. A significant factor affecting recurrence are the patients' presenting with an initial heart rate of over 200 beats per minute. Low systolic blood pressure, long duration of symptoms, structural heart disease, low serum Hematocrit, low serum sodium and serum potassium are significantly associated with hospitalization.

Potential conflicts of interest

None.

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การศึกษาอัตราการกลับเป็นซ้ำของโรคหัวใจเต้นเร็วผิดปกติชนิด PSVT ในผู้ป่วยที่มาห้องฉุกเฉิน โรงพยาบาลราชวิถี

สุมิตษ์ตรา ปียะณัตดิ์พูล, ประภัสสร ภัทรนานากุล

ภูมิหลัง: *โรคหัวใจเต้นเร็วผิดปกติชนิด PSVT (paroxysmal supraventricular tachycardia) เป็นโรคหัวใจที่พบบ่อยในผู้ป่วยอายุน้อย ถึงแม้ไม่มีผลคุกคามต่อชีวิตผู้ป่วย แต่อาการที่เป็นอย่างฉับพลันทันใดความถี่ของอาการและความรุนแรงที่มากขึ้นสามารถรบกวนการใช้ชีวิตประจำวัน และเพิ่มความวิตกกังวลให้กับผู้ป่วยได้มาก พบว่าผู้ป่วยมักมีอาการกลับเป็นซ้ำได้บ่อย โดยยังไม่มีการศึกษาถึงอัตราการกลับเป็นซ้ำในผู้ป่วยผู้ใหญ่อย่างชัดเจน และยังไม่ทราบถึงสิ่งกระตุ้นที่ทำให้มีอาการ และปัจจัยที่สัมพันธ์กับการกลับเป็นซ้ำและรับไว้นอนโรงพยาบาลในประชากรไทย*

วัตถุประสงค์: *เพื่อศึกษาอัตราการกลับเป็นซ้ำของภาวะหัวใจเต้นเร็วผิดปกติชนิด PSVT ปัจจัยกระตุ้นที่ทำให้เกิดหัวใจเต้นเร็วผิดปกติชนิด PSVT จนต้องมาโรงพยาบาล ความสัมพันธ์ของปัจจัยกระตุ้นที่มีผลต่อการกลับเป็นซ้ำ และความสัมพันธ์ของปัจจัยที่มีผลต่อการรับไว้นอนในโรงพยาบาล*

วัสดุและวิธีการ: *เป็นการศึกษาเชิงพรรณนาแบบเก็บข้อมูลช่วงเวลาหนึ่ง ในผู้ป่วยที่ได้รับการวินิจฉัยและรักษาโรคหัวใจเต้นเร็วผิดปกติชนิด PSVT ในห้องฉุกเฉินโรงพยาบาลราชวิถี ตั้งแต่วันที่ 1 กันยายน พ.ศ. 2551 ถึง 31 สิงหาคม ปี พ.ศ. 2554*

ผลการศึกษา: *ผู้ป่วยทั้งสิ้น 55 ราย เข้ารับการตรวจรักษา 94 ครั้ง มีอัตราการกลับเป็นซ้ำใน 90 วันที่ ร้อยละ 20 สำหรับปัจจัยที่มากระตุ้นให้เกิดภาวะ PSVT พบว่าร้อยละ 45.7 ไม่มีปัจจัยที่มากระตุ้นชัดเจน ร้อยละ 33 มีภาวะเครียดทางอารมณ์และออกกำลังกายเป็นสิ่งกระตุ้น ร้อยละ 20.1 มีประวัติขาดยาพบว่า ถ้าอัตราการเต้นหัวใจแรกรับมากกว่า 200 ครั้งต่อนาที มีผลต่อโอกาสการกลับเป็นซ้ำสูงอย่างมีนัยสำคัญทางสถิติ (HR 2.43, p = 0.017) พบว่าค่าความดันโลหิต (systolic blood pressure) แรกรับเฉลี่ยที่ต่ำกว่าปกติ ระยะเวลาที่มีอาการมานานก่อนถึงโรงพยาบาล มีโรคที่มีความผิดปกติทางโครงสร้างของหัวใจ ค่าความเข้มข้นของเลือด น้อยกว่า 30 เปอร์เซ็นต์ (hematocrit) ระดับโซเดียมในเลือดน้อยกว่า 135 มิลิกรัมและระดับโปรตัสเซี่ยมในเลือดน้อยกว่า 3.5 มิลลิกรัม มีความสัมพันธ์กับการต้องรับผู้ป่วยไว้นอนในโรงพยาบาลสูงอย่างมีนัยสำคัญทางสถิติ (p = 0.013, p = 0.012, p = 0.004, p = 0.001, p = 0.001, p = 0.004) ตามลำดับ*

สรุป: *ผู้ป่วยหัวใจเต้นเร็วผิดปกติชนิด PSVT ที่มารับการรักษา ณ ห้องฉุกเฉินโรงพยาบาลราชวิถี มีอัตราการกลับเป็นซ้ำในระยะเวลา 90 วันที่สูง ปัจจัยที่มีผลต่อการกลับเป็นซ้ำคือ ผู้ป่วยที่มีอัตราการเต้นของหัวใจแรกรับมากกว่า 200 ครั้งต่อนาทีและ มีหลายปัจจัยที่มีความสัมพันธ์ต่อการรับผู้ป่วยไว้ในโรงพยาบาล*